**Measuring Graft Flow**
Accurate measurements are technique dependent.
- Select a Flowprobe sized so that the graft will fill at least 75% of the lumen of the Probe without compressing the graft.
- Fill Probe window with ultrasound gel.
- Position Probe on graft (not over metal clips or fascia).
- Occlude native coronary artery and measure graft flow to establish maximum flow for the graft.
- When flow reading is stable (10-15 seconds), press PRINT, take snapshot or record on AureFlo®.

**Does Mean Flow Confirm Graft Patency?**
- Acceptable Mean Flow > 30 mL/min
- Medium Range Mean Flows (5 - 30mL/min)

**Is Pulsatility Index (PI) between 1 & 5?**
A PI greater than 5 is generally associated with low mean flow and systolic-dominant flow pattern indicating that the graft should be reexamined.

**Examine Graft**
- With Probe on the graft, turn on FlowSound® and listen for pitch increases as adjustments are made to the graft (1 octave pitch ‘K’ = 4 ‘xK’ in flow).
- Look for kinks/twists in the graft, low MAP, dampened waveform
- Redo anastomosis if technical error is indicated.

**Flow Waveform Analysis**
**Diastolic-Dominant Pattern**
For grafts to the left ventricle, the shorter waveform peak is usually systolic, and the higher, broader peak is diastolic (Fig. 1) except in the presence of severe tachycardia where diastole is shortened. An acceptable left ventricular waveform is “diastolic dominant” where the delivered diastolic blood volume (i.e., area under diastolic curve) exceeds delivered systolic blood volume.

**Balanced Systolic/Diastolic Pattern**
In grafts to the right ventricle, flow is more equally distributed between the systolic and diastolic phases. This produces a flow waveform where the systolic peak may dominate but is followed by a proportionally strong diastolic flow producing a systolic/diastolic balanced waveform (Fig. 2).

**Stenotic Pattern**
In stenotic grafts, the systolic peak dominates the flow profile and is associated with low or zero-mean flow. Often, systolic charge flow flows backwards as a negative flow during diastole (Fig. 3).

**Questionable Flows**
For questionable mean graft flows (5 - 30 mL/min), the graft is evaluated through systolic/diastolic waveform properties, using FlowSound®, a printout or snapshot to examine the graft. A rule of thumb is that systole lasts one-third of a heart beat and diastole lasts two-thirds.
Coronary Graft Patency Assessment Protocol Cont.

Measure Graft Flow

Evaluate Mean Flow Reading (per mean flow chart)

- **Good Flow**
  - > 20 mL/min or > 30 mL/min (depending on a patient’s size and physiology)

- **Questionable or Poor Flow**

  Examine Graft (spasm/kinks/twists/soft BP)

  Remeasure Graft Flow with native coronary artery occluded (mean flow reading & waveform printout)

  Reevaluate Mean Flow Reading (per mean flow chart)

  Flow Waveform Analysis
  - Acceptable Flow Profile:
    - Diastolic Dominant (left ventricle)
    - Systolic/Diastolic balanced (right ventricle)
    - Acceptable Pulsatility Index (1 - 5)

  Analyze Other Factors
  - Small patient/small target vessel?
  - Physiologic factors (MI, vasospasm, low MAP)?
  - Poor runoff?
  - Quality of myocardium?

  Patent Graft
  Proceed to measure flow in next graft

  Acceptable Flow Profile

  Questionable Flow

  Questionable or Poor Flow
  < 15 mL/min

  Poor Flow
c

  < 5 mL/min

  Analyze Other Factors
  - Small patient/small target vessel?
  - Physiologic factors (MI, vasospasm, low MAP)?
  - Poor runoff?
  - Quality of myocardium?

  Suspect Graft

  Examine Graft for Anastomotic Error
  Revise graft

  Acceptable Graft